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Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer
Thirty-fifth meeting
Bangkok, 22–24 April 2015

Report of the thirty-fifth meeting of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer

I. Opening of the meeting

1. The thirty-fifth meeting of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer was held at the United Nations Conference Centre in Bangkok from 22 to 24 April 2015. The meeting was held in accordance with decision XXVI/9, by which the Twenty-Sixth Meeting of the Parties decided to "convene a two-day workshop, back to back with an additional three-day meeting of the Open-Ended Working Group in 2015, to continue discussions on all issues in relation to hydrofluorocarbon management, including a focus on high-ambient temperature and safety requirements as well as energy efficiency, taking into account the information requested in the present decision and other relevant information". The meeting was co-chaired by Mr. Paul Krajnik (Austria) and Ms. Emma Rachmawaty (Indonesia).

2. The meeting was opened at 10 a.m. on Wednesday, 22 April 2015, by Ms. Rachmawaty.

3. Ms. Tina Birmpili, Executive Secretary of the Ozone Secretariat, made an opening statement in which she recalled that the current meeting and the workshop of the previous two days had been organized, pursuant to decision XXVI/9, to provide clarity on all issues related to the management of hydrofluorocarbons (HFCs) and the availability of alternatives, while taking into account the various views and concerns of the parties to the Montreal Protocol. Accordingly, the provisional agenda for the meeting had been prepared in wide consultation with the parties to ensure that it reflected their views and concerns.

4. Regarding the agenda, she drew particular attention to four substantive items: the technical and cost issues related to alternatives to HFCs (item 4); synergies with the United Nations Framework Convention on Climate Change, including legal and reporting issues (item 6); key issues for discussion toward a possible HFC management policy and legal framework under the Montreal Protocol (item 7); and possible ways forward (item 8). The discussions on item 4, she said, would be informed not only by the outcomes of the intensive exchanges at the workshop but also by the preliminary information provided by the Technology and Economic Assessment Panel in a preliminary extract from the report it was preparing in response to decision XXVI/9, which would be made available to the parties in the near future. Item 6 would give parties an opportunity to consider, inter alia, how cooperation between the Montreal Protocol and the Framework Convention on Climate Change could be enhanced in the area of HFC management; under item 7, they could discuss the mechanisms and features of the Protocol that they regarded as relevant for managing and regulating HFCs; while additional input for the discussion under item 8 had been provided in a conference room

paper submitted by Zimbabwe and Senegal on behalf of African States on a process for regulating the production and consumption of hydrofluorocarbons under the Montreal Protocol.

5. She drew attention to the note by the Secretariat providing an overview of issues related to HFCs and their management (UNEP/OzL.Pro.WG.1/35/2 and Corr.) and to documents UNEP/OzL.Pro.WG.1/35/3, containing a revised version of the amendment proposal submitted previously by Canada, Mexico and the United States of America, and UNEP/OzL.Pro.WG.1/35/4, containing an amendment proposal submitted by India which she said, added the diversity required for parties to achieve convergence on possible ways to address HFCs under the Montreal Protocol.

6. In considering how to address HFCs, she suggested, the parties might wish to keep in mind the impact of international regulations, which promoted investment, research and development and provided a level playing field by enhancing balance, equity and access to technologies in the global markets, as well as the need to ensure fairness to developing countries through the use of differentiated baselines, timeframes, a financial mechanism and the institutions of the Montreal Protocol, including the national ozone units.

7. In conclusion, she urged the parties, whom she described as the custodians of the Montreal Protocol, to remember that while it was easy to cause major changes to the atmosphere it was very difficult to restore equilibrium, and to factor into their considerations the lengthy time lag between decision-making, action and the responsiveness of the atmosphere. Open and informed discussions, she said, would help to build bridges between diverging views, strengthen trust and cooperation among parties and pave the way for a path forward to emerge.

II. Organizational matters

A. Attendance

8. The following parties to the Montreal Protocol were represented: Albania, Angola, Argentina, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Belarus, Belgium, Belize, Benin, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Burkina Faso, Cambodia, Cameroon, Canada, Chile, China, Colombia, Comoros, Côte d'Ivoire, Cuba, Democratic People's Republic of Korea, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, Estonia, Ethiopia, European Union, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Grenada, Guinea-Bissau, Guyana, Honduras, India, Indonesia, Iraq, Ireland, Italy, Japan, Jordan, Kenya, Kuwait, Lao People's Democratic Republic, Latvia, Lebanon, Lesotho, Lithuania, Madagascar, Malawi, Malaysia, Maldives, Mali, Mexico, Micronesia (Federated States of), Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Nigeria, Norway, Oman, Pakistan, Palau, Panama, Paraguay, Philippines, Poland, Portugal, Qatar, Republic of Korea, Republic of Moldova, Russian Federation, Saint Lucia, Samoa, Sao Tome and Principe, Saudi Arabia, Senegal, Seychelles, Singapore, Slovakia, South Africa, Spain, Sri Lanka, Sudan, Swaziland, Sweden, Switzerland, Thailand, Timor-Leste, Tunisia, Turkey, Turkmenistan, Uganda, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United Republic of Tanzania, United States of America, Uruguay, Vanuatu, Venezuela (Bolivarian Republic of), Viet Nam, Zambia and Zimbabwe.

9. The following United Nations entities, organizations and specialized agencies were represented as observers: Secretariat of the Multilateral Fund for the Implementation of the Montreal Protocol, secretariat of the United Nations Framework Convention on Climate Change, Global Environment Facility, United Nations Development Programme, United Nations Environment Programme, United Nations Industrial Development Organization and the World Bank. Also in attendance were representatives of the Scientific Assessment Panel and the Technology and Economic Assessment Panel of the Montreal Protocol.

10. The following intergovernmental, non-governmental and industry bodies were represented as observers: Air-conditioning and Refrigeration European Association, Alliance for Responsible Atmospheric Policy, Arctic King Home Appliances, Asia Pacific Technology Centre, Belarusian RAC Association (APIMH), Blue Star Ltd, Brenntag Ingredients Public Company Limited, Cannon Far East (Thailand) Co. Ltd., Cannon SpA, Carnot Refrigeration, Carrier Air-conditioning & Refrigeration Limited, Center for Climate and Energy Solutions, Centre for Climate and Environment, Centre for Science and Environment, Chemical and Environmental Engineering, China National Petroleum and Chemical Planning Institute, Children's Investment Fund Foundation, Chiller Solutions, China Household Electrical Appliance Association, China Refrigeration and Air-Conditioning Industry Association, Climalife, Cofely (Thailand), Council on Energy, Environment and Water, CSR Global Environment Centre, Daikin Europe N.V., Daikin Industries (Thailand), Ltd, Daikin Industries Ltd, USA, Daikin Industries, Ltd, Japan, Daikin Industries, Ltd, India, Danish Technological Institute,

DENSO Corporation, DEVCCO District Energy Venture, DuPont China Holding Co., Ltd., Proklima Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Development Engineering, DuPont Company, DuPont Emerson Climate Technologies, Inc., Energy Efficiency Services Limited, Energy Foundation China, Environmental Investigation Agency, EPTA Latam, European Partnership for Energy and the Environment, Federal University of Uberlandia , Brazil, Gujarat Fluorochemicals Ltd., Gulf Cooperation Council of the Arab States, ICF International, Honeywell, Industrial Technology Research Institute, Ingersoll Rand, Institute for Governance and Sustainable Development, Institut für Energietechnik Bitzer Stiftungsprofessur für Kälte-, Kryo- und Kompressorentechnik, International Institute of Refrigeration, Inventech, Japan Refrigeration and Air-Conditioning Industry Association, Lawrence Berkeley National Laboratory, National Institute for Environmental Studies, Natural Resources Defense Council, Petra Engineering, Refrigerant Reclaim Australia Ltd., Refrigerants Australia, Refrigeration and Air-conditioning Manufacturers' Association, Refrigeration and Air-Conditioning Technicians for Development Association of the Philippines, Ref-tech Engineering, RHY Synergy Sdn Bhd, SEAI, Shecco, SINTEF Energy Research, Smart Refrigerant, SRF Limited, Tata Motors Limited, Technische Universität Dresden, Tecumseh Euro Malaysia Sdn Bhd, Tecumseh Euro (Thailand) Co. Ltd., Terre Policy Centre, Toshiba Carrier Corporation, Turkerler Energy, United Technologies Corporation, University of Maryland.

B. Adoption of the agenda

11. The Working Group adopted the following agenda on the basis of the provisional agenda set out in document UNEP/OzL.Pro.WG.1/35/1:

1. Opening of the meeting.
2. Organizational matters:
   (a) Adoption of the agenda;
   (b) Organization of work.
3. Overview of the global situation with regard to hydrofluorocarbons:
   (a) Atmospheric abundance, trends and projections: Scientific Assessment Panel;
   (b) Production and consumption patterns and trends: Technology and Economic Assessment Panel.
4. Technical and cost issues related to alternatives to hydrofluorocarbons:
   (a) Response to decision XXVI/9:
      (i) Report by the Technology and Economic Assessment Panel on its progress under paragraph 1;
      (ii) Outcome of the workshop on hydrofluorocarbon management: technical issues (paragraph 2);
   (b) Energy efficiency;
   (c) Safety requirements;
   (d) Challenges for high ambient temperature conditions.
5. Policies and measures across countries and regions.
6. Synergies with the United Nations Framework Convention on Climate Change, including legal and reporting issues.
7. Key issues for discussion towards a possible hydrofluorocarbon management policy and legal framework under the Montreal Protocol:
   (a) Policy objectives;
   (b) Hydrofluorocarbon phase-down, taking into account hydrochlorofluorocarbon phase-out;
   (c) Means to address sector- and country-specific challenges;
   (d) Strengthening existing means of implementation;
   (e) Capacity-building, technology transfer, funding requirements and financial mechanism.

8. Possible ways forward.

9. Other matters.

10. Adoption of the report.

11. Closure of the meeting.

12. During discussion of the agenda one representative said that there should be no presentation of proposed amendments to the Montreal Protocol at the current meeting. In response the Co-Chair reiterated that while there was no specific agenda item relating to proposed amendments, in accordance with decision XXVI/9 parties were free to raise any issue pertaining to the management of HFCs, including proposed amendments.

C. Organization of work

13. The Working Group adopted a proposal on the organization of work presented by the Co-Chair. During discussion of the proposal, one representative suggested that all discussion during the current meeting should take place in plenary sessions and that no contact groups should be established. The Co-Chair indicated that, in accordance with the Working Group's regular practice, the decision on whether to establish a contact group for any particular item on the agenda would be made during discussion of the item.

III. Overview of the global situation with regard to hydrofluorocarbons

14. Introducing the item, the Co-Chair drew attention to document UNEP/OzL.Pro.WG.1/35/2, which contained information on emissions and atmospheric abundances of HFCs from the 2014 Assessment by the Scientific Assessment Panel, and on HFC production and consumption from the report of the Technology and Economic Assessment Panel on alternatives to ozone-depleting substances, issued in October 2014.

A. Atmospheric abundance, trends and projections: Scientific Assessment Panel

15. Mr. Paul Newman, co-chair of the Scientific Assessment Panel, presented an overview of the abundance, trends and projection of HFCs in the atmosphere. He described the changes observed in atmospheric abundance of ozone-depleting substances from 1996 to 2012 and future projections to 2050, as well as various possible scenarios for HFC emissions to 2050 and their implications. A summary of the presentation, prepared by Mr. Newman, is set out in annex I to the present report.

16. Following his presentation, Mr. Newman responded to a number of questions and requests for clarification. He indicated that while levels of HFCs were currently quite low, they were projected to become relatively high by 2050, by which time they could represent 25 per cent of CO_2-equivalent emissions. He also explained that the projection graphs had been constructed by taking the concentration of the gas in a given year and multiplying it by the radiative efficiency of that gas. In response to a question regarding the proportion of HFC-23 emissions in the atmosphere, he noted that 2011 HFC-23 emissions were somewhat less than 200 CO_2-equivalent megatonnes, while the total for all HFCs was just over 800 CO_2-equivalent megatonnes. Addressing a question regarding the contribution of HFCs to global warming in the overall world emissions of carbon dioxide, which was believed to be less than 0.5 per cent, Mr. Newman indicated that he did not have exact figures but could provide them. Finally, responding to a question regarding the metrics used in the panel's projections, he noted that the projection chart was based on total radiative forcing but that figures for global temperature potential and global-warming potential (GWP) could also be found in the assessment report for all HFCs.

B. Production and consumption patterns and trends: Technology and Economic Assessment Panel

17. Ms. Bella Maranion, co-chair of the Technology and Economic Assessment Panel, made a presentation on current HFC demand and projected demand to 2030, by sector. A summary of the presentation prepared by Ms. Maranion is set out in annex I to the present report.

18. Following the presentation, Ms. Maranion and Mr. Lambert Kuijpers, co chairs of the Technology and Economic Assessment Panel task force on decision XXV/5, responded to members' questions.

19. Addressing a question regarding the difference between Article 5 and non-Article 5 parties in terms of capacities and the availability of current technologies, Ms. Maranion indicated that she could not currently provide a full response, but that panel members hoped to learn more during the course of the current meeting. In response to a request, she said that in updating the information requested in decision XXV/5 in the report being produced in response to decision XXVI/9, data on low-GWP refrigerants, which was too small to appear on the charts, could be presented in metric tonnes.

20. Responding to a request for more information on refrigerant use beyond 2015, she indicated that the Panel was considering updating that information in the report on decision XXVI/9 and hoped to be able to provide information on the expected growth of each refrigerant in Article 5 parties. Mr. Kuijpers added that in Article 5 parties some HFC consumption was related to the freeze in 2013 of HCFCs; there was also HFC consumption that was not related to HCFC replacement, however, and the business-as-usual and mitigation scenarios represented best estimates for both markets. In response to another question about whether Executive Committee decisions on HCFC phase-out management plans (HPMPs) had been taken into account in the HFC consumption projections, he added that the impact of Executive Committee decisions on HFC production for HCFC replacement was not significant in the context of rapidly growing HFC production aimed at meeting new demand.

21. In response to a question on the degree of certainty in the panel's projections given the uncertainty of the demand data and difficulty comparing bottom-up estimates, he said that demand data was only used to cross-check bottom-up estimates, and he estimated the degree of uncertainty of those estimates at approximately 10 per cent.

22. Addressing a query regarding how many new substances or alternatives had been found in the previous two years, he said that there were a large number of new low-GWP refrigerants, most of which were synthetic. In the previous 10 years or so, manufacturers had worked to develop very-low-GWP HFOs that were blends tailored to perform well in certain applications, but the number of actual refrigerants produced was much smaller. More new blends would probably be produced in the next few years, but not new refrigerants, although he stressed that development continued.

23. In response to a question about information on new refrigerants and technologies, Ms. Maranion said that parties could request reports and report updates from the Panel through decisions, as they had done, but that the Panel's regular progress reports, as well as its quadrennial reports also provided such information. In response to that question and others on how data, studies and the information learned from the workshop on hydrofluorocarbon management could be incorporated into the panel's report and used as a basis for policy decisions, she said that the Panel would take into account all questions, comments and information from the current meeting and the HFC management workshop in further developing its report in response to decision XXVI/9 and its update to the report prepared in response to decision XXV/5.

24. Responding to a question on trends in refrigerant mixes and whether production data on such mixes was available, he said that in the previous couple of years a rapidly growing number of mixes had become available in developed countries, for which no production data was available. It would take a few more years with more data before clear consumption trends could be established for the various subsectors to 2030 or beyond. He also indicated that the panel hoped to cover the question in more detail in its report prepared in response to decision XXVI/9.

IV. Technical and cost issues related to alternatives to hydrofluorocarbons

A. Response to decision XXVI/9

1. Report by the Technology and Economic Assessment Panel on its progress under paragraph 1

25. Ms. Maranion and Mr. Kuijpers, as co-chairs of the task force established by the Technology and Economic Assessment Panel in response to decision XXVI/9, made a presentation on the extract report of the task force on alternatives to ozone-depleting substances, as requested by the Secretariat for the current meeting, stressing that the information had yet to be reviewed and would be revised before the Panel submitted the finalized report to the Working Group for consideration at its thirty-sixth meeting. A summary of the presentation prepared by the presenters is set out in annex I to the present report.

26. Following the presentation, general appreciation was expressed for the information that had been provided at short notice, which one representative said had also proved useful for the workshop on HFC management. One representative, speaking on behalf of a group of countries, asked for a

better presentation of the graphs and figures to make them mutually comparable for better understanding. Responding to questions and comments from the floor, including from one representative speaking on behalf of a group of parties, Mr. Kuijpers said that the Panel had based its scenarios on current best estimates of the lifetime of equipment, which could reasonably be expected to change in the future, and that it would be difficult to provide region-specific estimates; that figures in its forthcoming report prepared in response to decision XXVI/9 would be presented in both tonnes and CO_2 equivalence; that the Panel considered expectation patterns in terms of an individual country's needs and equipment base and not whether equipment was imported or exported; that any available data from the testing of specific equipment in high ambient temperatures would be taken into account in future reports, although no such data would figure in the forthcoming report; that the data on aerosols would not be limited to aerosols for medical purposes; and that the Panel would carry out a detailed analysis of the impacts of early action to tackle HFCs in terms of costs and environmental benefits. He furthermore welcomed offers from two representatives, including one speaking on behalf of a group of parties, to provide the Panel with the results of their testing of low-GWP alternatives, especially in high ambient temperatures.

27. Mr. Roberto Peixoto, co-chair of the task force, responding to further questions from the floor, said that the finalized draft report would not take into account the fact that conversion periods would differ depending on the applications involved.

2. Outcome of the workshop on hydrofluorocarbon management: technical issues (paragraph 2)

28. Mr. Stephan Sicars and Ms. Karin Shepardson, rapporteurs for the workshop on hydrofluorocarbon management held on 20 and 21 April pursuant to decision XXVI/9, gave a report on the workshop, outlining the information presented in their summary of the workshop (UNEP/OzL.Pro.WG.1/35/5). Mr. Sicars began with a general description of the workshop, saying that the participants had first heard an overview of the global situation on HFC production and consumption patterns, uses and trends. After the overview, six sessions had been convened, led by two facilitators. Each session had started with an overview presentation that was followed by panellist statements and a discussion of issues that provided insight into the status and challenges of HFC alternatives in different use sectors. At the end of the workshop, the rapporteurs of sessions 1–5 had presented summaries of the key issues arising from their sessions.

29. He then went on to give a brief description of the current uses of HFCs and the status of the availability and use of low-GWP alternatives, as well as the main barriers to adoption. Ms. Shepardson then reported on cross-cutting challenges and opportunities in the areas of energy efficiency, costs and intellectual property rights, safety and flammability, high ambient temperature, policy and regulatory frameworks and service sector training needs, as well as special challenges facing Article 5 parties. She closed the report with the key take-away messages of the workshop, which related to the existence of alternatives in almost all sectors, the need to account for energy efficiency, the need to be adaptive and flexible, new market penetration and new technology transfer, and tailored solutions.

30. Following the rapporteurs' presentation one representative, while commending the oral report of the rapporteurs, said that the advance written summary of the workshop prepared by the rapporteurs (UNEP/OzL.Pro.WG.1/35/5 (advance version)) did not fully agree with their oral report, which reflected the workshop discussions. For example, key findings on high ambient temperature conditions, namely, that there were currently no viable alternatives and that more time was needed to identify alternatives, were not mentioned in the advance written summary. Similarly, the report mentioned district cooling as a solution for high ambient temperature locations, while the conclusion reached during the workshop was more equivocal, emphasizing that the technology demanded large quantities of water and was inappropriate for smaller settings such as households. Another representative from the same party added that there were contradictions in the take-away messages, with a statement that alternative solutions had been developed in almost all sectors, primarily for non-Article 5 parties, contradicted by a statement that for several sectors there were no current solutions. On the matter of energy efficiency, the importance of total equivalent warming impact had not been mentioned. Finally, a statement that chiller systems could be a solution in some air-conditioning subsectors, he said, ran counter to the consensus that the workshop discussions should be technologically neutral and not favour one application above others.

31. Mr. Sicars responded that the report had not intended to suggest that district cooling systems offered a definite or unique solution for high ambient temperature countries, but rather that it was a potentially useful option. The final report would clarify the matter and ensure that a number of other points were clearly stated, including the idea that lifetime climate assessments were important tools for

assessing the overall impact of energy efficiency and refrigerant emissions and that while some said that chillers were a viable technological alternative others were not convinced.

32. One representative asked for more information on when alternative solutions that were in the developmental or experimental stages would become commercially available. Another representative requested clarification regarding the applicability of not-in-kind technologies as alternative for domestic and urban use, adding that demand for water in such systems could create a situation where solving one problem led to creation of another. Another representative said that while issues of safety and flammability had been stressed in discussions, other issues surrounding alternatives needed to be taken into account, such as their effect on human health, their atmospheric lifetimes, their ability to break down into harmful substances and their wider environmental impact.

33. Responding, Ms. Shepardson said that the workshop report aimed to be commensurate with the content and level of detail of the discussion during the workshop and that it did not discuss things that were not mentioned during the workshop. The rapporteurs would consider several of the issues raised, however, such as district cooling, energy efficiency and the special situation of high ambient temperatures and would better reflect them in the summary.

34. The parties took note of the information presented with appreciation for the work of the rapporteurs.

B. Energy efficiency

C. Safety requirements

D. Challenges for high ambient temperature conditions

35. The Working Group discussed sub-items 4 (b)– (d) together.

36. Introducing the sub-items, the Co-Chair recalled that in decision XXVI/9, the Meeting of the Parties had agreed that the current meeting should be held back to back with the two-day workshop to continue discussion on all issues related to HFC management, with a focus on energy efficiency, safety requirements and challenges for high ambient temperature conditions. He opened the floor for any further discussion of those issues.

37. One representative said that although the technical discussions had been rich, solutions were still needed in many areas. Another representative stressed the importance of energy efficiency, saying that more work was required to clarify challenges and potential solutions. Another representative raised concerns about safety with regard to matters such as the toxicity of new alternatives for various animal and plant species, carcinogenic potential for humans, safety in car accidents and safety for ecological systems. Another representative said that full realization of energy efficiency was currently limited by overly strict standards that limited the use of certain alternatives, including hydrocarbon compounds in the small air-conditioning subsector. If that matter was not resolved, the phase-down of HFCs would face major challenges. All issues should be addressed in a balanced way, including safety, energy efficiency and protection of the climate.

38. With regard to challenges posed by high ambient temperatures, one representative, supported by others, said that the message from the workshop was that solutions for the air-conditioning sector were being developed but were not yet available on the ground. That made it very difficult for parties to develop medium-term and long-term plans for the sector and raised concerns regarding compliance with the Protocol.

39. One representative observed that due to a lack of proven and available alternatives in key subsectors, the Technology and Economic Assessment Panel needed to carry out an in-depth study of projects being carried out in the field, to assess the available alternatives for various applications in terms of their energy efficiency and other criteria and to make recommendations based on those studies. Alternatives were needed that were technologically feasible and at the same time protected the environment.

40. One representative said that the workshop had generated much encouraging information on alternatives. Climate-friendly alternatives were available in a range of sectors and subsectors, including the cold chain, domestic refrigeration and transport, and could be used safely and effectively in a variety of climatic conditions. While there were certain areas where viable alternatives had not been developed and deployed – for example unitary and split air-conditioning systems and systems for high ambient temperature conditions – alternatives were being developed and tested. She encouraged the Panel to provide additional information on alternatives in its reporting later in the year, while recognizing that for many end uses alternatives were already being used on a global basis. Another representative said that the concerns expressed by a number of parties about a lack of viable

alternatives in certain important sectors were entirely legitimate. Nevertheless, the proposals put forth to amend the Protocol attempted to take those concerns into account, and she urged all parties to take an active part in the discussions of the proposals and other matters under agenda item 7, bearing in mind both the challenges and the efforts by the proponents to recognize and address them.

41. The Working Group took note of the outcomes of the workshop and the comments made under the present agenda item, and requested the Technology and Economic Assessment Panel to take them into account in further developing the report requested under decision XXVI/9 prior to its consideration by the Open-ended Working Group at its thirty-sixth meeting.

V. Policies and measures across countries and regions

42. Introducing the item, the Co-Chair drew attention to section V of the note by the Secretariat (UNEP/OzL.Pro.WG.1/35/2), which contained information on national and regional regulatory frameworks, policies, measures and initiatives currently in place to control HFCs. The information had been compiled from the information submitted by parties in 2014 and 2015 regarding their implementation of paragraph 9 of decision XIX/6 in accordance with decision XXV/5. The Secretariat subsequently provided clarifications and updated information on national policies and measures submitted by a few parties and noted that it would continue to update and present revised versions of the document at future meetings as it received additional or updated information from parties.

43. All representatives who took the floor thanked the Secretariat for its efforts to compile the information, which showed that a wide range of initiatives were being undertaken in many countries. The representative of Norway reported that the introduction in her country of a tax on imports of HFCs had helped to restrain growth in HFC emissions. Introduced in 2003, the tax on a given HFC was approximately $45 per tonne multiplied by the GWP of the substance; the tax on HFC-134a, for example, was thus about $60 per kilogram, and on HFC-404A about $170 per kilogram. This had been supplemented with a refund scheme providing an equivalent rebate when HFCs were destroyed. By 2011 emissions of HFCs were an estimated 40 per cent lower than they would have been in the absence of the tax. Nevertheless, emissions were still increasing, pointing to the need for further measures at the international level.

44. The representative of the European Union reported that since the meeting of the parties in 2014 the European Union's fluorinated gas regulation had entered fully into force, with quotas being issued successfully to both market incumbents and new entrants. The supply of HFCs to the market had been frozen as of 2015 and the first phase-down step would come in 2016. By 2030, the supply would be reduced to 21 per cent. The experience of the European Union suggested that it was possible to begin the phase-down of HFCs in a region of many countries.

45. The representative of Paraguay said that after considering potential phase-down measures his Government had concluded that it would be more straightforward simply to ban imports of air-conditioning equipment containing HCFCs. That was an unusual approach, but one which he felt held great promise.

46. The representative of Japan observed that his country's new legislation on fluorocarbons, which would help to phase down the production and consumption of HFCs, had entered into force in April 2015.

47. The representative of Australia reported that her country would be reviewing its existing legislation on ozone-depleting substances and synthetic greenhouse gases with a view to considering further controls. She said that the compilation of information provided by the Secretariat showed that many activities were under way internationally, including in Article 5 parties, generally in conjunction with HPMPs. She noted, however, that the emergence of different regulatory regimes and different economic incentives and disincentives in different countries created a situation of considerable uncertainty over the future of HFCs. Industrial innovation required the existence of a stable long-term regulatory framework to encourage appropriate investment and purchasing decisions – which was why many industry groups were calling for a global framework for the phase-down of HFCs, as had come into being for CFCs and HCFCs.

48. The Working Group took note of the information presented.

VI. Synergies with the United Nations Framework Convention on Climate Change, including legal and reporting issues

49. Introducing the item, the Co-Chair drew attention to section II of the note by the Secretariat (UNEP/OzL.Pro.WG.1/35/2), which contained a brief historical account of the long-standing cooperation between the Montreal Protocol and the United Nations Framework Convention on Climate Change, and to section V (B) of the same document, which contained a summary on the policy framework related to HFCs under the Framework Convention on Climate Change.

50. In the ensuing discussion many representatives expressed support for the development of further synergies between the Montreal Protocol and the Framework Convention on Climate Change. A variety of perspectives were expressed, however, regarding the appropriate paths for doing so and how concern for such synergies should affect the consideration of proposals to phase-down the production and consumption of HFCs.

51. Noting that HFCs represented a very small percentage of current greenhouse gas emissions, several representatives suggested that the time and effort spent discussing how to control them would be better spent on other issues. Other representatives underscored that the production and consumption of HFCs were expanding rapidly, saying that it was therefore important to address them as soon as possible. Moreover, because the expanding use of HFCs was due largely to the phase-out of CFCs and HCFCs under the Montreal Protocol, employing the Protocol to control them represented a significant opportunity to enhance synergies between the two ozone and climate regimes.

52. A number of representatives said that before the parties to the Montreal Protocol could consider establishing controls on HFCs it was necessary for the Conference of Parties to the Framework Convention on Climate Change to authorize such action or for the two treaties to hold one or more joint meetings. In their view, the issue of HFC emissions was clearly the responsibility of the Framework Convention on Climate Change and important legal and policy issues had to be resolved before the Protocol could establish binding controls on HFCs.

53. In a similar vein, several representatives said that the two treaties had their own specific mandates, competencies, underlying principles, regulatory regimes, reporting requirements and other individual features. Establishing HFC regulations under the Montreal Protocol without approval by the parties to the Framework Convention on Climate Change or addressing such differences would create significant problems rather than enhance synergies. One treaty could not establish regulations on behalf of another without a clear legal mandate. Real synergies could only be achieved if the two treaty regimes moved forward together under clearly established procedures. Two representatives added that requiring developing countries to restrict their use of HFCs, which were greenhouse gases but not ozone-depleting substances, and also to meet consequential HFC reporting requirements, would be incompatible with how the principle of common but differentiated responsibilities operated under the Framework Convention on Climate Change, under which both greenhouse gas restrictions and emissions reporting were voluntary for developing countries. Such measures would also cost developing countries millions of dollars to address emissions that represented less than one per cent of total, current radiative forcing from anthropogenic greenhouse gases even though under the Framework Convention on Climate Change only industrialized countries were required to take action. In addition, the Multilateral Fund would probably only meet the agreed incremental costs of phasing down HFCs, again contradicting important aspects of the Framework Convention on Climate Change. One representative also argued that establishing controls on a specific greenhouse gas would contradict the existing controls under the Framework Convention on Climate Change, which allowed parties to reduce the greenhouse gases of their choice in accordance with their national circumstances.

54. Other representatives, however, argued that establishing controls on HFCs under the Montreal Protocol represented an important and effective mechanism for promoting synergies between the goals and operation of the Protocol and the Framework Convention on Climate Change. In their view, there were no legal issues that prevented the Protocol from establishing controls on HFCs and it was possible to craft an amendment to the Protocol that would clearly set out the respective responsibilities of the two treaties with regard to HFCs. Synergies between the two regimes would be enhanced as the Protocol would address the production and consumption of HFCs while the Framework Convention on Climate Change would continue to address emissions in exactly the same ways it did currently.

55. One of those representatives noted that in accordance with some of the proposed amendments HFCs would not be addressed as controlled substances under the Montreal Protocol in the same manner as ozone-depleting substances. The latter (as opposed to HFCs) were slated for elimination and there was therefore no need for their emissions to be monitored under the Framework Convention on Climate Change. As for HFCs, the amended Montreal Protocol would phase down their production

and consumption, leaving the Framework Convention on Climate Change to maintain existing, or take additional, measures, if any, to address HFC emissions. Another noted that an HFC amendment would simply continue an existing pattern of synergies in which the parties to the Protocol had taken collective measures to support lower GWP replacements for CFCs and HCFCs. Two representatives said that overlapping and mutually reinforcing international environmental treaties were quite common, citing as examples the Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, the Stockholm Convention on Persistent Organic Pollutants and the Minamata Convention on Mercury, among others.

56. Several representatives said that the legal analysis provided during the workshop on HFC management in July 2014 on potential interaction between the Protocol and the Framework Convention on Climate Change with regard to HFCs offered potential ways forward that should be considered. Some said that other measures than an amendment of the Protocol could be adopted, such as continuing or expanding the mandate of the Executive Committee of the Multilateral Fund to support low-GWP solutions for the phase-out of HCFCs.

57. One representative drew attention to Article III of his country's proposal to amend the Protocol to establish controls on HFCs, saying that it was not intended to except HFCs from the scope of the Framework Convention on Climate Change and that, consequently, the amendment of the Montreal Protocol to cover HFCs would require the amendment of the Framework Convention on Climate Change.

58. The Working Group took note of the points raised.

VII. Key issues for discussion towards a possible hydrofluorocarbon management policy and legal framework under the Montreal Protocol

59. Introducing the agenda item, the Co-Chair explained that it was his intention to ensure that parties could raise every issue they considered to be of concern under at least one of the agenda sub-items. While noting that all the sub-items were closely linked, he hoped that it would nevertheless be possible to address them separately in order to enable more in-depth consideration of the issues.

A. Policy objectives

60. Opening the floor for discussion of sub-item 7 (a), the Co-Chair invited representatives to focus on what they aimed to achieve on the issue of HFC management under the Montreal Protocol, keeping in mind that subsequent sub-items would provide the opportunity to discuss at greater length the means of achieving those objectives.

61. Many representatives said that the overall policy objective was to avoid future growth in emissions of HFCs, with an accompanying significant impact on climate change, by gradually phasing down the production and consumption of HFCs. Representatives recalled the presentations by the Scientific Assessment Panel and the Technology and Economic Assessment Panel, which had provided projected growth rates in HFC emissions, their likely impact on the climate and the importance in particular of the refrigeration and air-conditioning sector.

62. Many representatives noted that HFC use was growing because parties were phasing out the use of ozone-depleting substances under the terms of the Montreal Protocol, and the Protocol was the international instrument under which all aspects of HFC production, consumption and use could be fully addressed, including technology choices following from the accelerated phase-out of HCFCs, the need to address HFCs introduced as replacements for CFCs, and HFC by-products. Another essential aspect of the objective that they noted was the need to minimize the economic impact of introducing low-GWP alternatives to HFCs. Many countries were putting in place policies and measures to address such issues, but a number of representatives said that a coherent international framework was still lacking.

63. One representative drew attention to the outcome of the Third International Conference on Small Island Developing States, which had concluded by recommending action to gradually phase down the production and consumption of HFCs.

64. Other representatives, while agreeing that the impact of HFC emissions on climate change needed to be addressed, recalled that HFCs were already covered under the Framework Convention on Climate Change and said that they could be expected to be included in the new climate agreement scheduled to be agreed in 2015. It should not be assumed that action on HFCs should be taken under

the Montreal Protocol, and in the view of some the climate change regime was better suited to the control of HFCs because of the flexibility it allowed parties to take action to reduce emissions across a basket of greenhouse gases; in comparison, the Montreal Protocol adopted a much more rigid approach.

65. Other representatives, however, argued that while the basket approach worked well for many greenhouse gases, it was less well suited to synthetic substances such as HFCs. Previous experience had shown that for such substances the Montreal-Protocol approach of gradually phasing out production and consumption would be more effective in stimulating the development of alternative technologies and in providing financial assistance to developing countries. In addition, the Montreal Protocol possessed significant elements of flexibility itself, including essential-use and critical-use exemptions, and the ability to address very specific issues such as the lack of alternatives to methyl bromide for treating high-moisture dates. The effectiveness of this approach had been demonstrated by the very small number of cases of non-compliance experienced over time.

66. Several representatives said that HFCs could not be addressed until other issues of great importance were resolved; they included technical issues related to alternatives to HFCs, including their cost-effectiveness, energy efficiency, environmental impact and commercial availability, the lack of alternatives for some uses, particularly in high-ambient temperature environments, the legal relationships between the climate and ozone regimes and the availability of financial assistance. It made no sense, they said, to set the overall policy objective in isolation from the full consideration of all those issues, which would require extensive consultations.

67. In particular, representatives wanted to avoid the need for a double replacement of HCFCs, which were already being phased out under the Montreal Protocol. It was essential to avoid the kind of short-term fixes that had already been experienced under the Protocol, such as the replacement of CFCs by HCFCs. Indeed, given that it was impossible to know the long-term impacts of synthetic chemicals such as HFCs or HFOs, one representative argued that preference should always be given to natural substances, saying that current activities were stifling companies' efforts to develop such natural alternatives.

68. Some representatives argued that parties needed greater certainty about the future availability of alternatives before they could commit to action. Despite years of discussions, it was still not clear what alternatives were available for applications in high ambient temperatures. The argument that if countries regulated now industry would produce alternatives was not adequate; it risked the danger of some companies developing monopolies over the supply of substances that were essential to development, which in turn would inhibit economic growth.

69. Representatives agreed on the need for the debate to remain open-ended and inclusive of all solutions without prejudging the outcome. Many said that the current agenda item allowed for precisely such a debate and that the discussion of the proposed amendments to the Montreal Protocol over the last few years had enabled key issues to be addressed and progress to be made that would not have taken place if the amendments had not been discussed.

70. Summarizing the main elements of the discussion, the Co-Chair said that it was clear that parties shared a common objective of avoiding increased greenhouse gas emissions from the production and consumption of HFCs. Coordinated action was needed, but it needed to be taken in a broad context, developing long-term solutions rather than short-term fixes. Clearly HFCs were included under the Framework Convention on Climate Change and might be covered by the new climate agreement. There was a continuing debate about the need for a global phase-down of HFCs, which would need to be subject to the resolution of a range of legal and technical issues; those issues would be discussed in greater detail under the other sub-items of agenda item 7.

71. In response, some representatives said that there was no agreement on a common objective and reiterated their view that HFCs should be addressed as one of a basket of greenhouse gases rather than in isolation.

B. Hydrofluorocarbon phase-down, taking into account hydrochlorofluorocarbon phase-out

72. Introducing the item, the Co-Chair recalled that as parties implemented activities and projects to achieve the phase-out of HCFCs, HFCs were being adopted as alternatives in many applications as the most suitable, commercially available and affordable substitutes. The purpose of the agenda sub-item was to afford parties the opportunity to discuss HFC phase-down in the light of the HCFC phase-out.

73. Many representatives expressed support for the proposals to phase-down HFCs, saying that the increasing use of HFCs posed a major threat to the Earth's climate. One representative in particular emphasized that the Montreal Protocol possessed the institutional capacity to deal with the problem, and was informed by the principles of equity and common but differentiated responsibilities and respective capabilities of countries.

74. Several representatives said that it would be necessary to ensure coherence between the on-going phase-out of HCFCs and any phase-down of HFCs. That was less of an issue in non-Article 5 parties, where HCFC phase-out was largely completed, but even in those countries it was important to ensure that the significant banks of HCFCs in old refrigeration and air-conditioning equipment were not replaced with high-GWP HFCs. The decision by the parties and the Executive Committee to provide up to 25 per cent additional funding to Article 5 parties who chose to replace HCFCs with low-GWP alternatives was proving helpful, but had its limitations in curbing growth in HFC use; not all HFCs were introduced as alternatives to HCFCs, for example. It was mentioned that if HFCs were added to the Montreal Protocol, financial incentives would become available and Article 5 parties could avoid the need for a double transition from HCFCs and receive financial support for doing so; such an approach would therefore have economic as well as environmental benefits.

75. It was mentioned that industry was already expressing serious doubts over the long-term sustainability of high-GWP HFC technologies, not just because of their environmental impacts but also because they were becoming increasingly regulated at the national and regional levels and because changes in global markets were anticipated. In the absence of an amendment to the Montreal Protocol, however, no support could be provided through the Multilateral Fund to help developing parties adapt to such changes.

76. The representative of a co-sponsor of the North American amendment proposal, said that the proposed amendment sought to create a predictable policy framework that allowed for the use of low-GWP HFCs in replacing HCFCs – thus creating an ambitious phase-down schedule for HFCs without jeopardizing progress with the phase-out of HCFCs.

77. The representative of another co-sponsor of the proposed amendment, said that the problem of HFCs had begun with the phase-out of CFCs and could not be tackled solely through providing additional financing for the phase-out of HCFCs. The amendment attempted to take into account the concerns of all parties, and he was keen to enter into further dialogue on its contents, particularly in the light of the many positive proposals that had been made over the previous few days. He proposed the establishment of a formal contact group to facilitate a full exchange of views.

78. Another co-sponsor of the amendment, explained how it had been redrafted to take account of feedback received on the previous version. Dates for baselines and phase-down schedules had been revised, the calculation of baselines had been changed to allow for a more generous multiplier for HCFC consumption levels for Article 5 parties and a less generous multiplier for non-Article 5 parties, and the first phase-down step for Article 5 parties had been changed from 70 per cent to 80 per cent. A proposal for a mid-term review of the availability of alternatives and potential revision of the schedules had been introduced in response to the concerns expressed in particular by countries with high ambient temperatures. The date of the implementation of trade measures against non-parties had been put back and the number of ratifications required before they entered into force had been increased, both with the aim of giving countries more time to prepare for the changes to be effected by the amendment.

79. He welcomed the other proposals that had been put forward and were anticipated from other parties, including India and the European Union, which he said helped to highlight the key issues needing to be addressed: the speed of the phase-down, its start and end points, the calculation of baseline levels, the need for regular technology reviews, the application of trade measures, the need for national flexibility, how to deal with HFC by-products and how to align HFC phase-down with the HCFC phase-out. He called for a full and detailed discussion on these issues and any other matters of concern, noting the goal to have an amendment in 2015 that would be acceptable to all parties.

80. The representative of a regional economic integration organization described the key elements of a proposed amendment to the Protocol, which had been drawn up after extensive consultations with many parties based on a discussion paper made available to the parties previously. The proposed amendment would be communicated to the parties before the six-month notification deadline. It was clear that since non-Article 5 parties were major consumers of HFCs they had to take the lead in phasing down their production and consumption. His proposal would include a first phase-down step in 2019 for non-Article 5 parties, 85 per cent of the agreed baseline and an end point of 15 per cent in 2034, the latter in recognition of the fact that there were some uses of HFCs for which energy-efficient and environmentally benign alternatives did not yet exist. Greater flexibility was included for Article 5

parties, with baselines and measures applying to a combined basket of HCFCs and HFCs, weighted by GWP; consumption would be frozen in 2019, with further phase-down steps to be agreed later. That would enable Article 5 parties to realize their developmental goals , allowing for an increase in HFC use as long as the climate impact expressed as the combined GWP-weighted total of HFC and HCFC consumption remained below the freeze level. Production of HFCs would be frozen in 2019, with a long-term goal of a reduction to 15 per cent by 2040. The proposal attempted to capture the benefits of early action, which the Technology and Economic Assessment Panel had stressed would be less costly and would create important synergies with HPMPs. He called for detailed discussion of all issues of concern in a formal contact group on HFCs.

81. One representative reported that his party and another would be submitting a proposed amendment to the Montreal Protocol in the near future. He said that his country fully appreciated the concerns raised by some parties and believed that the best way to take them into account would be through discussions in a contact group; that approach was shared by some representatives and opposed by others.

82. One representative, however, recalled the experience with phasing out CFCs. HCFCs had initially been regarded as acceptable substitutes, he said, but then pressure had built for their accelerated phase-out. Now parties were being asked to phase down HFCs, but it was impossible to do so while simultaneously phasing out HCFCs. Judging from previous experience, it was quite possible that in a few years' time parties would be asked for one reason or another to accelerate the phase-down of the alternatives to HFCs that they were currently being urged to adopt.

83. In addition, many argued, parties were being asked to phase down HFCs notwithstanding that alternatives were not available for all uses, especially in high-ambient-temperature countries. In the absence of currently available alternatives it was impossible to draw up strategies for future development because it was equally impossible to estimate the cost of transition to technologies that did not yet exist. Furthermore, new technologies would take many years to be developed, evaluated and introduced. Given that, any baseline levels calculated according to the proposed amendments would be very low or even zero for many Article 5 parties, making it impossible for them to phase out HCFCs. Accordingly, discussion of HFC phase-down should be delayed until alternatives were available for all uses. Further studies of alternatives, penetration of not-in-kind technologies and experimental and demonstration projects should be carried out across a range of sectors and countries with financing from the Multilateral Fund. The release of patents and exemptions were also issues that needed to be thoroughly addressed.

84. Some representatives commented on the challenges that their countries already faced in phasing out HCFCs, including the need to revise regulations, the need for capacity-building and training and the need for industry, in particular small and medium-sized enterprises, to adapt. Many Article 5 parties were making major efforts to phase out HCFCs through the use of low-GWP alternatives, but in reality HFCs were the only alternatives available for many uses. Putting too many burdens on Article 5 parties risked inhibiting the pace of their economic development, and it was important not to be too hasty in reaching decisions.

85. One representative stressed that it was not only countries in West Asia that experienced high ambient temperatures, but many other countries as well as deep mines. Another observed that temperatures in some countries sometimes exceeded 50°C; in such circumstances, he said, air-conditioning was essential to life and development. Several representatives said that until alternatives to HFCs were available for all uses they could not agree to the establishment of a contact group.

86. One representative argued that HFCs had only a very small impact on climate change, accounting for less than one per cent of global warming. If parties were really concerned about climate change, he said, they should make more efforts to reduce their emissions of carbon dioxide. In addition, more efforts could be undertaken to reduce leakage of HFCs, which the workshop had shown was a major source of emissions.

87. Other representatives, however, said that there was clear scientific evidence of a rapid growth in HFC consumption, which was why many countries were beginning to regulate HFCs and why many international forums, including heads of government in the Group of Eight, the Group of Twenty and the African Ministerial Conference on the Environment, had called for action to address HFCs through the Montreal Protocol. The need to gradually phase down production and consumption of HFCs had also been stressed by the Conference on Small Island Developing States.

88. Several representatives of Article 5 parties commented on the efforts that their countries were already making to phase out HCFCs, saying that HFC phase-down and HCFC phase-out had to proceed in parallel. One representative observed that his country had decided to avoid HFCs as alternatives to HCFCs and had thus effectively already begun an HFC phase-down. Another commented that HCFC phase-out in his country was leading to a sharp uptake in HFC technologies, which would continue in the absence of a strong regulatory signal.

89. There were obvious synergies, said some, between HFC phase-down and HCFC phase-out; they involved the same sectors, the same industries and the same technologies. It therefore made obvious sense to avoid the multiple transitions and to address both families of chemicals in a holistic way, taking full account of issues such as energy efficiency. Funding needed to be made available for the development of alternatives to HFCs and their testing under various circumstances and in various countries and climatic conditions. None of that could be achieved, however, without an appropriate international regulatory framework.

90. Some representatives, acknowledging that alternatives did not yet exist for all uses of HFCs, said that in the past parties to the Montreal Protocol had been able to take decisions in the absence of full information; that was an example of respect for the precautionary principle, and it was one of the reasons that the Protocol had been as effective as it was. The Protocol also had a history, they stressed, of accommodating parties with particular needs; under the essential-use exemption process, for example, ozone-depleting substances that had been phased out for most uses could still be used by parties for other uses deemed essential. It might not be possible to find solutions to all problems, but the needs of parties could be accommodated and it was not reasonable for parties not to agree to discuss the issue.

91. One representative said that there was a need for greater capacity-building to assist Article 5 parties in phasing down both HCFCs and HFCs simultaneously. She also said that there was a need to consider funding for the destruction of existing banks of HCFCs and HFCs.

92. Some representatives, while accepting that there were clearly some uses for which alternatives to HFCs were not yet available, pointed out that alternatives were available for many other uses, and they argued that the opportunity to introduce them should be grasped. There would never be one ideal solution, so there was no point in waiting for it to be developed; compromises were always necessary. Furthermore, the regulations being introduced by many countries to control HFCs would have a significant impact on the market, but in the absence of an amendment to the Protocol the Multilateral Fund would be unable to provide assistance to Article 5 parties to help them adjust.

93. Some representatives, acknowledging that not all questions of a legal and technical nature had yet been answered and that there had not been time to consider fully the more recent proposed amendments, said that the best way forward would be to discuss all issues in a contact group. In a similar vein, other representatives said that a contact group would enable them to fully discuss and understand the implications of the various proposals for all countries. Other representatives, however, did not support the establishment of a contact group and one representative emphasized that objections to the formation of a contact group had been based on logical arguments that required logical counter arguments.

94. Concluding the discussion and thanking the representatives for their contributions, the Co-Chair recalled that the possible establishment of a contact group would be discussed fully under agenda item 8, on possible ways forward.

C. Means to address sector- and country-specific challenges

95. Introducing the sub-item, the Co-Chair said that the parties should build on the momentum of the discussion under sub-item 7 (b) and focus on the ways in which the challenges pertaining to specific uses of high-GWP substances had previously been addressed under the Montreal Protocol.

96. In the ensuing discussion, there was general recognition that many parties would face significant challenges in any effort to phase down the consumption and production of HFCs, including a need for training and expertise, safety issues, appropriate regulations, intellectual property rights and above all the lack of affordable, viable low-GWP alternatives for various sectors and sub-sectors, including in particular the refrigeration and air-conditioning sector in high ambient temperature countries. Several representatives said that they would be unwilling to enter into any binding commitments in the absence of viable, cost-effective and commercially available alternatives. One representative expressed concern that new alternatives might create new problems as, he said, had been the case in the switch from CFCs to HCFCs. Another expressed concern about the poor energy efficiency of some alternatives and the need for large quantities of water for the use of others, which constituted significant impediments in hot, dry climates. A third said that the scale of investment

required to move to low-GWP alternatives to HFCs would undermine food security for his country's large population. Another representative said that the high price of alternatives to HFCs had the potential to disrupt the balance of payments of developing countries and would have social implications.

97. Other representatives acknowledged the various challenges and their importance to the countries concerned, saying that they were keen to discuss them with those countries in order to come up with specific solutions to specific challenges, with several suggesting a technical review to identify countries' technology needs in specific sectors, including the servicing sector. Two representatives drew attention to mechanisms that had long served to deal with special circumstances under the Montreal Protocol, including exemptions for critical, essential, laboratory and analytical, process agent and feedstock uses; a similar approach could be adopted in the case of HFCs, allowing for their continued use for specific applications until viable alternatives became available. One representative noted that any party could propose an adjustment to the Protocol to deal with any problems with the pace of HFC phase-down or the suitability of alternative technologies and substances. She also observed that the Multilateral Fund financed demonstration and validation projects as a means of addressing specific concerns regarding alternatives. Another representative stressed that the proposed amendments to the Protocol did not call for a phase-out of HFCs but rather a phase-down, which would allow for a residual amount of the substances to be used to address specific challenges where alternatives were lacking.

D. Strengthening existing means of implementation

E. Capacity-building, technology transfer, funding requirements and financial mechanism

98. The Working Group discussed sub-items 7 (d) and 7 (e) together. Introducing them, the Co-Chair listed features of the Montreal Protocol widely regarded as contributing to its success: universal ratification, grace periods for Article 5 parties, periodic assessment and review of control measures, a financial mechanism with equal Article 5 and non-Article 5 party representation and a non-compliance regime that was facilitative rather than punitive.

99. In the ensuing discussion, representatives said that technology transfer, capacity-building, institutional strengthening and the financial mechanism were of particular importance for effective implementation, but also said that there was a need for information sharing, maintaining stakeholder confidence, management and destruction of ozone-depleting substance banks, the development of codes and standards, demonstration projects and flexibility at the national level. Other representatives offered their ideas on one or more of those items based on their country's experience with implementation of the Montreal Protocol to date.

100. One representative suggested that non-Article 5 countries had transferred obsolete technologies in the past, leaving Article 5 parties with the problem of phasing them out. One representative said that technology rather than lines of production should be transferred, calling for the release of patents so that developing countries could use new technologies. He also said that his country had had difficulty with project co-funding requirements and suggested that financing guidelines needed to be clearer.

101. Another representative spoke of problems encountered with project implementation due to the behaviour of certain equipment suppliers, which had led to production losses. Dealing with multinational corporations had been a problem in general, and institutional strengthening had not yet provided a solution.

102. The development of a comprehensive system of codes and standards was identified by one representative as essential to the proper implementation of alternatives to HFCs and HCFCs. The same representative said that sufficient time should be allowed for the capacity-building required for the industrial sector to absorb new technologies and implement them properly. He also said that there was a need for the financial mechanism to cover the servicing sector, which was particularly strained by the need to adapt to new technologies.

103. With regard to financing, one representative suggested that parties would be in a better position to adopt financing and other measures once they knew the outcome of the upcoming climate negotiations, which would probably have an impact on HFCs. He said, too, that interdependence with the Framework Convention on Climate Change highlighted the need to maintain close ties with the climate change secretariat. He also stressed the importance of capacity building and the need for harmonization among countries and staying up to date if new substances were to be used.

104. Describing her country's successful experience with introducing environmentally sound technologies in stage I of its HPMP, one representative said that stage II of many HPMPs would deal with conversions in the refrigeration sector, for which international consensus on technology was lacking. The hope was that small enterprises would participate in the phase-out process, yet small enterprises faced major challenges associated with handling cost issues and acquiring the right technologies. She suggested that stage II support policies might provide more incentives for small and medium-sized enterprises to undertake technology conversions. In addition, it would be helpful for the Multilateral Fund to carry out more demonstration projects to promote the use of new technologies in new sectors in developing countries as a means of helping those countries to gain confidence. She also pointed out that for her country and some other developing countries, HFC production was an industry of vital importance, sometimes supporting 50 per cent of employment in a region. She suggested that paying more attention to such issues, being more flexible in policies and expanding the range of new technologies available to developing countries would help those countries gain confidence and lead to a more effective phase-down.

105. Two representatives from small island developing States said that it was vital to address HFC consumption, with one of them requesting that small island developing States and other countries with small economies be given priority for the transfer of information on available technologies.

106. One representative said that the standardized methodology used for project implementation to date had not allowed for individual country circumstances such as wars, which for his country had led to difficulties in project implementation.

107. One representative said that alternative technologies were desirable from a climate and economic point of view but were often unfortunately accompanied by problems related to flammability and toxicity. Options were available on the market to use such substances safely, but it was first necessary that professionals be properly trained in equipment maintenance and safe use. The means should be provided to ensure that competence and knowledge were transferred to Article 5 parties to facilitate their use of alternative substances and technologies. Safety standards should also be put in place to support implementation at the national level, while at the same time such standards should be adapted to keep pace with technological developments to facilitate the use of alternatives.

108. Another representative said that strengthening the means of implementation was of utmost importance when discussing HFCs and the proposed amendments to the Montreal Protocol. The financial mechanism, he recalled, was defined by Article 10 of the Protocol, which stipulated that the mechanism should meet all agreed incremental costs of Article 5 parties to enable their compliance with control measures. Relevant to that was decision XIX/6, by which the parties in 2007 agreed to accelerate the phase-out of production and consumption of HCFCs and that the funding available through the Multilateral Fund should be stable and sufficient to meet all agreed incremental costs to enable Article 5 parties to comply with the accelerated phase-out. That decision had also directed the Executive Committee to develop and apply criteria for funding. There were a number of interpretations, however, of the phrase "stable and sufficient", and it was not until April 2010 that the Executive Committee had established guidelines on financing HPMPs. In hindsight, the lack of specific guidance to the Executive Committee in decision XIX/9 had been detrimental to confidence in the Montreal Protocol. The lesson could be drawn that any inclusion of HFCs under the Protocol should be accompanied by clear guidance on how related activities were financed, and the proposed amendment put forward by the North American countries lacked detail on financial issues. If HFC phase-down-related activities were to be viable for Article 5 parties, early engagement was needed to give them assurance on how commitments would be addressed under the financial mechanism of the Protocol. While a number of parties could not agree with opening a formal process of discussion on that matter, that need not be an obstacle to moving forward, as instruments were available under the Protocol that would enable action to commence on dealing with HFCs within the current framework. Following the successful replenishment of the Multilateral Fund in 2014, sufficient resources were available to finance stage II of HPMPs along with other activities as the problem itself demanded.

109. Another representative said that discussion of strengthening the means of implementation was directly related to Article 10 of the Protocol. It was clear from the proposed North American amendment and the accompanying draft decision that Article 10 would have to be amended to make the phase-down and control of HFC-23 eligible for funding under the Multilateral Fund. Statements by representatives of Article 5 parties, however, had made it clear that further assurance was needed on levels of assistance, types of financing, conditions for access to funding and other matters. He agreed that progress on the proposed amendment would require cooperation between parties to establish a financing mechanism that avoided previous misunderstandings. While acknowledging previous shortcomings, however, it was important to highlight the overall success of the financial mechanism in addressing the phase-out of HCFCs in Article 5 parties. While some parties had drawn attention to

implementation and technology transfer difficulties, those had arisen after project approval and did not reflect negatively on the funding framework itself. On the matter of the technologies being transferred to Article 5 parties, they were in fact often cutting-edge technologies, which was testament to the level of funding available through the Multilateral Fund. It was important to draw lessons from stage I of HPMPs and apply them to stage II. The Executive Committee had dealt with a very large number of requests for funding for HCFC phase-out, and some tough decisions on funding allocations had had to be made, with the principle of equity underlying all decision-making. Further, while the Executive Committee had a number of rules related to its activities, it retained the flexibility to make exceptions according to individual country circumstances. There had always been an opening for discussion, and it was important to recall that precedent in the current debate on proposed amendments to the Protocol. It would be difficult to identify an international funding mechanism that had functioned as well as the Multilateral Fund over the previous 25 years, and with clear direction based on the principle of incremental costs the financial mechanism of the Protocol could prove as effective in controlling HFCs as it had been for ozone-depleting substances.

110. Another representative agreed that lessons from past events could inform the current discussions, and he said that further detail on how the financial mechanism might function under the proposed North American amendment could be useful. He also concurred that the recent healthy replenishment of the Fund would allow parties to consider again what was meant by "stable and sufficient" funding and what might be financed by those funds, including the phase-down of HFCs. He drew attention to the strong national ozone units under the Montreal Protocol, which had demonstrated their capacity to implement the phase-out of HCFCs and could perform the same task for HFCs. If a phase-down of HFCs were agreed upon, he continued, it would clearly mean more work for the national ozone units and for project management units, which would require additional capacity, and his party would support making resources available to support such capacity-building. Also, assisting technology transfer and technology conversions had always been the normal mode of operation of the Multilateral Fund, and that core model could easily be applied to assist Article 5 parties in moving to a new set of technologies. Incentives were available to promote the use of low-GWP alternatives in connection with stage II of HPMPs, he said, while acknowledging that more information was needed on alternatives in order to inform technology selection for HPMPs. In addition, challenges related to the servicing sector needed to be addressed as the institutional capacity of countries was strengthened. In conclusion, he said that there were clear opportunities to realize climate benefits and to finance mitigation activities under the aegis of the Multilateral Fund.

111. Another representative, speaking on behalf of a group of countries, drew attention to various projects funded by the European Commission and implemented by UNEP, for example in the Pacific region, Southeast Asia and West Africa, that aimed, inter alia, to promote climate-friendly alternatives to ozone-depleting substances. Further projects were planned, including with capacity-building components. Bilateral programmes of the European Union member States were also under way, for example with the Air-conditioning and Refrigeration European Association to train servicing personnel.

112. Another representative speaking on behalf of the same group of countries said that financial and technical support for the transition from ozone-depleting substances and HFCs towards economically viable and environmentally sound alternatives was of paramount importance. Such support should come through the successful mechanism that had served the Montreal Protocol and its parties well for over 25 years, and measures to reduce HFC production and consumption in Article 5 parties should be funded via the Multilateral Fund. He agreed with a previous speaker that, if an agreement were reached to amend the Montreal Protocol to include HFCs, the parties should be mandated to agree by means of decision the policies and obligations that would apply for the operation of the Multilateral Fund with regard to any new HFC requirements.

VIII. Possible ways forward

113. The representative of Senegal, speaking on behalf of African States, introduced a conference room paper containing a proposal to establish a contact group at the thirty-sixth meeting of the Open Ended Working Group, in July 2015, to consider proposals to amend the Montreal Protocol to regulate the production and consumption of HFCs. He noted that the proposal aligned with a declaration adopted by the African Ministerial Conference on the Environment in March 2015 that expressed support for a gradual global phase-down of HFCs.

114. Several representatives objected to consideration of the conference room paper. In their view, the current meeting had been convened for the purpose of examining strictly technical issues arising out of the HFC Workshop that had immediately preceded it, and for exchanging related information, but not for discussing proposals to amend the Montreal Protocol. One representative, supported by

several others, said that he had specifically noted his opposition to the consideration of any conference room papers during discussion of the adoption of the agenda for the meeting. Several other representatives supported consideration of the conference room paper, with some saying that decision XXVI/9 clearly allowed for consideration of the conference room paper as it dealt with "all issues in relation to hydrofluorocarbon management".

115. The Co-Chair observed that it had been proposed during the adoption of the agenda that the conference room paper be considered under the current agenda item, and he said that as it had been proposed for discussion in accordance with the rules of procedure its consideration could proceed. The Senior Legal Officer of the Secretariat concurred that the submission of the conference room paper, its consideration by the Working Group and the decision by the Co-Chair to allow its consideration were all in compliance with the rules of procedure.

116. A number of representatives expressed support for the overall purpose of the conference room paper and for establishing a contact group at the next meeting of the Working Group, with several saying that they wished to work with the proponents of the paper to refine it. Several highlighted the environmental importance of controlling the production and consumption of HFCs and the opportunities to use the proven and successful institutions of the Montreal Protocol to do so. Some said that convening a contact group at its next meeting would allow the Working Group to build on positive elements of discussions held during the Twenty-Sixth Meeting of the Parties in 2014.

117. A number of other representatives opposed the establishment of a contact group. In their view, consideration of the proposal was inappropriate at the current time and, more broadly, further consideration of a possible HFC amendment should be postponed until more information could be obtained regarding the availability of proven, cost-effective, energy efficient alternatives in all sectors and subsectors that currently relied on HFCs, especially in countries with high-ambient temperatures. One representative said that further discussion of measures to address HFCs should be left to meetings under the Framework Convention on Climate Change.

118. Two representatives suggested that, rather than establish a contact group, the best path forward was to request the Technology and Economic Assessment Panel to gather additional information on issues of key concern to developing countries and with the aim of laying a firm foundation for potential policy discussions. Another representative said that a contact group should begin working while the Panel continued to gather information. Representatives offered a number of suggestions regarding areas on which the Panel should begin or continue to gather information, including, inter alia, HFC alternatives currently in use, particularly in the air-conditioning sector; lessons learned from the introduction of HFC alternatives in various sectors; the rates at which particular technologies were being introduced in various sectors; detailed data on HFC production and consumption in developing country parties; and technical information regarding how developing country parties planned to replace HFCs in each major sector and subsector over the next twenty-five years.

119. Another representative said that before considering formal proposals to amend the Protocol, it would be necessary to address a number of preliminary issues, including the establishment of a formal relationship with the secretariat of the Framework Convention on Climate Change in order to begin work on matters that would require coordination between the climate and ozone regimes; a commitment from donors to maintaining the same financial mechanism and, consequently, increasing the Multilateral Fund replenishment; ensuring flexibility for Article 5 parties in setting their strategies for HFC phase-down to allow them to choose the sectors to be considered priorities and the alternative technologies that they deemed most appropriate to their specific national circumstances, taking into account the availability of alternatives that had been thoroughly tested by Article 2 parties, the cost to developing countries, and similar factors; ensuring the second and third conversions of enterprises; and ensuring that cost effectiveness factors were developed based on a study of the real markets for new alternatives in Article 5 parties.

120. Following the discussion above the co-Chairs invited interested representatives to join them for informal consultations to examine possible ways forward.

121. Following the informal consultations, an extended further discussion of possible ways forward took place in plenary.

122. Views were expressed both for and against the proposal to establish a contact group in line with the conference room paper put forward by Senegal and Zimbabwe on behalf of the African States. Those favouring it spoke of the advantages of constituting a forum in which relevant issues could be discussed, saying that without such a forum it would be difficult to identify a way forward. Some representatives said that adjusting the terms of reference of the proposed contact group would be helpful. A number of representatives said that one reason to oppose formation of a contact group at the

current time was that there was a lack of clarity on alternatives and therefore no sound scientific basis for amending the Protocol. Several representatives said that a contact group was not the only possible way forward and that all options should be considered.

123. Some representatives spoke of the nature and purpose of contact groups. One said that a contact group provided a forum for dialogue even when views were widely divergent and that the compromise achieved might be very different from any of the proposals on the table at the outset of the group's discussions. Another, however, said that a contact group could only provide a meaningful forum when all sides agreed on the need to discuss an issue, which was not currently the case with regard to HFCs.

124. Several representatives urged patience, saying that deliberations on the matter of HFCs had been complex and sensitive. Reaching consensus on such an important issue was often a lengthy process, especially where a wide range of views existed and knowledge was incomplete. In addition, the outcomes of other forthcoming forums needed to be taken into consideration, including the climate change conference in Paris in November 2015. Some representatives said that further discussions between the Ozone Secretariat and the secretariat of the Framework Convention on Climate Change would be beneficial. One representative said that any change in policy or law should be scientifically sound and evidence based; fair and neutral and perceived to be so; and in proportion to the matter it was meant to address. Those requirements should be borne in mind when moving forward on the matter of HFCs and indeed any issue under the Montreal Protocol.

125. One representative said that the debate was taking place in the absence of key scientific data on HFCs regarding such matters as their contribution to total global warming and the total size of HFC banks, including with regard to HFCs used and held by non-Article 5 parties. Transparency on that matter was important for building consensus. Many representatives reiterated their stance that far more information was needed on the cost, energy efficiency, viability and other characteristics of alternatives in all sectors before any proposal to amend the Protocol could be formally discussed.

126. On the process for the way forward, some representatives said that the rules of procedure of the Protocol should be examined to find a procedural solution to the present impasse. Others urged that the traditional method of working by consensus should be adhered to, saying that that approach had always enabled solutions to be found in the past and was in accordance with the spirit of the Protocol. Several representatives said that, as a first stage, general principles should be established before specific activities were put in motion; parties should clarify the challenges to progress with regard to HFCs and develop a fuller understanding of the issues involved, the challenges and barriers faced and the positions of the various parties. The approach should be inclusive, taking into account the full range of viewpoints. A number of representatives said that a conference room paper discussed on the last day of the thirty-fourth meeting of the Open-ended Working Group contained elements that could contribute positively to the discussions. One representative said that further intersessional work could be undertaken, if appropriate, and that it was important to identify the crucial issues to be discussed so that work could start promptly at the thirty-sixth meeting of the Open-ended Working Group. Some representatives proposed further discussion of options for managing HFCs that did not entail amending the Protocol.

127. Several representatives said that the informal consultations on the way forward during the current meeting had proved useful, and they proposed that those discussions continue. In accordance with that proposal the Working Group decided that interested parties should continue the informal consultations.

128. Subsequently, one participant in those consultations reported that they had resulted in agreement on a way forward. In accordance with that agreement, the Open-ended Working Group decided that it would continue to work intersessionally in an informal manner to study the feasibility and ways of managing HFCs, including, inter alia, the related challenges set out in annex II to the present report, with a view to the establishment of a contact group on the feasibility and ways of managing HFCs at the thirty-sixth meeting of the Open-ended Working Group.

IX. Other matters

129. The Working Group took up no other matters.

X. Adoption of the report

130. The present report was adopted on the afternoon of Friday, 24 April 2015, on the basis of the draft report contained in documents UNEP/OzL.Pro.WG.1/35/L.1 and Add.1 and 2. The Ozone Secretariat was entrusted with the finalization of the report following the closure of the meeting.

XI. Closure of the meeting

131. The thirty-fifth meeting of the Open-ended Working Group of the Parties to the Montreal Protocol was declared closed at 5.15 p.m. on Friday, 24 April 2015.

Annex I

Summaries of presentations by members of the Scientific Assessment Panel and the Technology and Economic Assessment Panel on the global situation with regard to hydrofluorocarbons

A. Presentation by members of the Scientific Assessment Panel on atmospheric abundance, trends and projections (agenda item 3 (a))

1. The Scientific Assessment Panel co-chairs spoke on the evolution of trace species in the atmosphere, from CFCs to HCFCs to HFCs. The talk was largely derived from the Panel's "Scientific Assessment of Ozone Depletion: 2014."

2. The first part of the presentation focused on the evolution of ozone-depleting substances. From 1996 to 2012 atmospheric chlorine levels had declined from about 3.5 ppb to 3.2 ppb, a change of 312 ppt, or 9 per cent. Most of that change had resulted from the disappearance of methyl chloroform (CH3CCl3). Similarly, atmospheric bromine had declined by 2 ppt, or 12 per cent, as a result of the sharp decrease in methyl bromine (CH3Br). While the total bromine contribution from halons had declined in the 1996–2012 period, halon-1301 levels had increased by about 1 per cent. In the stratosphere, equivalent effective stratospheric chlorine continued to decline, with recovery to 1980 levels expected in the 2040–2050 period.

3. Ozone-depleting substances were also greenhouse gases, and their continued decrease reduced climate forcing. In 2012, emissions of CFCs, HCFCs and HFCs (in gigatonnes of CO2 equivalent per year) were approximately equal. Emissions of those substances in 2012 totalled about 2.5 gigatonnes CO2 equivalent, with CFC emissions declining, HCFC emissions approximately level and HFC emissions on the increase. The increased emissions of HFCs had led to rising levels of HFCs in the atmosphere. The contribution of HFCs to climate change was very small, currently less than 1 per cent, but if HFC use continued as projected it would make a significant contribution to climate forcing in the coming decades, perhaps reaching as much as 0.4 watts per square meter by 2050.

B. Presentation by members of the Technology and Economic Assessment Panel on HFC production and consumption patterns and trends (agenda item 3 (b))

4. Ms. Bella Maranion, co-chair of the Technology and Economic Assessment Panel, made a presentation on current and future HFC demand by sectors. She noted that the presentation was based on the final report of the Panel's decision XXV/5 task force, which had been presented at the Twenty-Sixth Meeting of the Parties. Looking at the developing markets for HFCs in both parties operating under paragraph 1 of Article 5 of the Protocol (Article-5 parties) and parties not so operating, she said that demand for HFCs had grown in both but was particularly significant in Article 5 parties: more than 30 per cent annually over the period 2006–2011, with expected further growth in the 5–7 per cent range after 2016. Regulations, including the European Union fluorinated gas regulation that had entered into force in 2015 and other regulations being considered by Japan, the United States and others, could affect future demand for HFCs. She noted that the Panel had derived HFC demand data from bottom-up calculations for the period up to 2014, the results of which were presented in several previous reports by the Panel's technical options committees and task forces. She said that there were challenges in comparing bottom-up demand calculations with regard to blends and pure chemicals against rough production estimates and suggested that as a means of addressing those challenges the Meeting of the Parties might wish to consider providing for future reporting of HFC production and consumption data consistent with existing reporting requirements under the Protocol for both non-Article 5 and Article 5 parties. The business-as-usual demand scenario incorporated the current Montreal Protocol phase-out framework, including the decision XIX/6 adjustment accelerating the HCFC phase-out. She noted that the current HFC demand data encompassed the refrigeration and air-conditioning sector, which had the greatest demand (85 per-cent in terms of global-warming potential), the foams sector (about 8 per cent) and other sectors (about 7 per cent) for the period 2012–2014.

5. She then provided an overview of the basic trends in global HFC demand compared to non-Article 5 party and Article 5 party demand over the period 1994–2014, where significant continuing growth in demand in Article 5 parties was foreseen. She then provided an overview of the alternatives and business-as-usual demand focused on the two major sectors, refrigeration and air-conditioning and foams. Demand in refrigeration and air-conditioning applications clearly dwarfed

that in the various foam subsectors. Global foam blowing agent demand was expected to exceed 520,000 tonnes by 2020 unless further gains in blowing efficiency were achieved as technologies developed. The transition from ozone-depleting substance blowing agents reflected the early availability of hydrocarbons, which had had a substantial impact in that sector, as well as the availability of HFCs, HFOs and HCFOs. In refrigeration and air-conditioning, business-as-usual demand in non-Article 5 Parties was expected to increase by about 50 per cent between 2015 and 2030, reaching about 900,000 kilotonnes CO_2 equivalent in 2030. In comparison, business-as-usual refrigerant demand in Article 5 parties was expected to increase by more than a factor of three between 2015 and 2030, reaching about 2.3 million kilotonnes CO_2 equivalent in 2030. She concluded by suggesting that the emerging availability of high performance low-GWP refrigerants would provide new opportunities, although no single solution was likely, and that foam blowing agent demand would continue to grow, with the possibility that critical sectors would continue to be dependent on HFCs. She noted that the Panel's work, including the presentation to be made at the current meeting on the decision XXVI/9 task force extract report, would provide further information on the impact of various measures on mitigation scenarios.

C. Presentation by members of the Technology and Economic Assessment Panel on the progress of the Panel's work in accordance with paragraph 1 of decision XXVI/9 (agenda item 4 (a) (i))

6. Ms. Bella Maranion and Mr. Lambert Kuijpers, as co-chairs of the Technology and Economic Assessment Panel's decision XXVI/9 task force, made a presentation on the extract report of the task force on alternatives to ozone-depleting substances, as requested by the secretariat for the current meeting. Ms. Maranion presented an overview of the planning and timeline, including the formation of the task force, for preparing a response to the decision. She also explained that while work was ongoing on the report, the extract and presentation were to provide information on the progress of that work in order to inform Parties' discussions at the current meeting. She noted that the information would change as work proceeded towards the finalization of the decision XXVI/9 task force report. She listed the members of the task force, noting that they included members from various technical options committees as well as outside experts.

7. Mr. Kuijpers then presented highlights of certain topics being considered in the report. With regard to refrigerants, he noted that the preliminary information outlined in the extract would be further elaborated on in the report, with an update of the list of all low-GWP refrigerants currently being considered and an analysis of potential performance of low-GWP refrigerants under high ambient temperature conditions. With regard to refrigeration and air-conditioning applications, he noted that the report would consider options for new and existing equipment by sub-sector, including performance characteristics and safety considerations, as well as specific information related to equipment performance under high ambient temperature conditions. With regard to business-as-usual and mitigation scenarios in that sector, he noted that the report would further elaborate on the impact of the various refrigerants as well as the refrigeration and air-conditioning sub-sectors and would offer a more precise investigation of the impact of the length of the conversion period in mitigation scenarios for the sector in non-Article 5 and Article 5 parties. He also mentioned the status of the report in the sectors of fire protection and aerosols, specifically for medical uses. In the case of fire protection, any updated information becoming available would be added, and for medical uses more technical information on all aerosols would be collected. He concluded by noting that the extract was meant to provide a status report on the work in progress for the decision XXVI/9 task force report, as requested for the current meeting. The information would change as work proceeded towards the finalization of the report, which would need to be submitted to the Technology and Economic Assessment Panel for review and consensus. The report would then be available by the beginning of June 2015 for consideration at the thirty-sixth meeting of the Open-ended Working Group, in July 2015.

Annex II

Challenges to be addressed

- Energy efficiency
- Funding requirements
- Safety of substitutes
- Availability of technologies
- Performance and challenges in high ambient temperatures
- Second and third conversions
- Capacity-building
- Non-party trade provisions
- Synergies with the United Nations Framework Convention on Climate Change (legal, financial aspects)
- Relationship with the HCFC phase-out
- Ecological effects (effects on fauna and flora)
- Implications for human health
- Social implications
- National policy implications
- Challenges to the production sector
- Rates of penetration of new alternatives
- Exemptions and ways to address lack of alternatives
- Technology transfer
- Flexibility in implementation